

DOK PROGRESSION GUIDE • SBAC MATHEMATICS

Grade 7 Math

Every SBAC claim and target for Grade 7 Math, with a Test Bank question at each Depth of Knowledge (DOK) level the blueprint assesses, and the clicks to find more.

DOK 1 Recall

DOK 2 Skills & concepts

DOK 3 Strategic thinking

DOK 4 Extended thinking

For Grade 7 Math teachers. Claims, targets and DOK levels follow the official Smarter Balanced blueprint.

achievetrictestbank.com • October 2026 edition

How to use this booklet

Depth of Knowledge (DOK) describes the kind of thinking a question asks for, not how hard it is. A long calculation can still be DOK 1, and a short question can be DOK 3. For each target, this booklet shows one question at every DOK level SBAC assesses it at, so you can see the climb and then pick questions at the level your students need next.

The four DOK levels

DOK 1 • Recall

Recall a fact, term or property, or carry out a routine one-step procedure. Read a value straight from a table or graph.

DOK 2 • Skills & concepts

Decide how to approach it and use two or more steps: compare, classify, interpret data, or move between representations.

DOK 3 • Strategic thinking

Reason and plan: justify an answer, critique an argument, use evidence, or solve a problem with no routine path.

DOK 4 • Extended thinking

Carry out an extended investigation that connects several ideas, conditions or sources. On SBAC, DOK 4 is assessed only in the performance task, and only for Claim 3 and Claim 4 targets.

Reading a target page

1. The heading names the claim, the target code and the official target wording, with the standards it draws on.
2. The DOK ladder shows which levels the SBAC blueprint assesses for this target in this grade. Levels in grey with a line through them are not assessed for this target.
3. One example question at each assessed level, lowest first, with the answer shown. Read them top to bottom to see how the thinking climbs.
4. "Why DOK n" explains in one sentence what makes the question that level, so you can spot the same thing in your own questions.
5. "Find more like this" lists the exact Test Bank clicks that generate more questions for the same target at the same level.

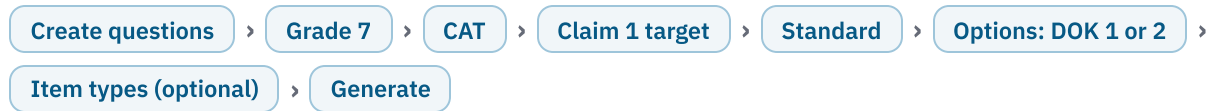
Which DOK levels each target is assessed at comes from the official Smarter Balanced test blueprint for this grade (2015–16 Summative Technical Report, Appendix 2.A). Every example was checked by hand against the DOK definitions above, not just its Test Bank tag. A few targets had no Test Bank question that truly fit a level, so we wrote one; those are marked "Written for this guide."

Finding these questions in the Test Bank

Every example page ends with the exact clicks. These are the two routes, starting from Create questions with Grade 7 Math chosen as the grade.

Claim 1 targets (CAT)

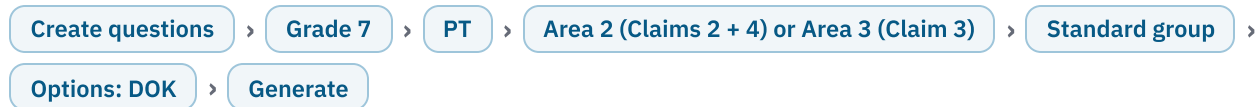
Claim 1 questions are filed by target and standard.



The DOK buttons only allow the levels the blueprint assesses for that target, so a level that is greyed out in this booklet is greyed out in the Test Bank too.

Claims 2, 3 and 4 (PT)

These claims are built from performance-task standard groups.



Each question card shows its claim and target, such as "Claim 3 · Tgt B". Generate at the DOK you want, then keep the cards for your target.

Questions you have saved

Saved questions are filed the same way in your Item Bank.



Tip: to move a class up the ladder, generate the same target at the next DOK level. To check that a skill is secure before going further, generate a set at the lowest assessed level.

All targets at a glance

A dot means the SBAC blueprint assesses the target at that DOK level in this grade. Each dot has an example question in this booklet.

Claim 1 • Concepts & Procedures

Target	DOK 1	DOK 2	DOK 3	DOK 4
1A Analyze proportional relationships and use them to solve real-world and mathematical problems	—	●	—	—
1B Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers	●	●	—	—
1C Use properties of operations to generate equivalent expressions	●	●	—	—
1D Solve real-life and mathematical problems using numerical and algebraic expressions and equations	●	●	—	—
1E Draw, construct, and describe geometrical figures and describe the relationships between them	●	●	—	—
1F Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	●	●	—	—
1G Use random sampling to draw inferences about a population	●	●	—	—
1H Draw informal comparative inferences about two populations	—	●	—	—
1I Investigate chance processes and develop, use, and evaluate probability models	●	●	—	—

Claim 2 • Problem Solving

Target	DOK 1	DOK 2	DOK 3	DOK 4
2A Apply mathematics to solve well-posed problems	—	●	●	—
2B Select and use appropriate tools strategically	●	●	●	—
2C Interpret results in the context of a situation	●	●	●	—
2D Identify important quantities and map their relationships	●	●	●	—

Claim 3 • Communicating Reasoning

Target	DOK 1	DOK 2	DOK 3	DOK 4
3A Test propositions or conjectures with specific examples	—	●	●	—
3B Construct chains of reasoning that will justify or refute propositions	—	●	●	●
3C State logical assumptions being used	—	●	●	—
3D Use the technique of breaking an argument into cases	—	●	●	—
3E Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is	—	●	●	●
3F Base arguments on concrete referents such as objects, drawings, diagrams, and actions	—	●	●	—
3G Determine conditions under which an argument does and does not apply	—	●	●	—

Claim 4 • Modeling & Data Analysis

Target	DOK 1	DOK 2	DOK 3	DOK 4
4A Apply mathematics to solve problems from everyday life (Modeling)	—	●	●	—
4B Construct chains of reasoning to justify mathematical models	—	●	●	●
4C State logical assumptions being used	●	●	●	—
4D Interpret results in the context of a situation	—	●	●	—
4E Analyze adequacy and make improvements to existing models	—	●	●	●
4F Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas)	●	●	●	—
4G Identify, analyze, and synthesize relevant external resources to pose or solve problems	—	—	●	●

CLAIM 1

Claim 1 • Concepts & Procedures

Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency. Claim 1 is tested with individual items on the computer adaptive test (CAT). In the Test Bank, choose CAT, then the target.

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CLAIM 1 · CONCEPTS & PROCEDURES

1A Analyze proportional relationships and use them to solve real-world and mathematical problems

Standards: 7.RP.A.1; 7.RP.A.2a; 7.RP.A.2c; 7.RP.A.2d; 7.RP.A.3

Assessed at: DOK-1 **DOK 2** DOK-3 DOK-4

DOK 2 · Skills & concepts

Why DOK 2: Students must find the unit rate first, then use it to judge an equation and two scaled costs, so several connected steps are needed.

A volleyball team is ordering sports drinks for their tournament. The team found that 6 bottles cost 15 dollars. Select all the statements that are true about this proportional relationship.

☐ 18 bottles would cost 45 dollars ✓

☐ 12 bottles would cost 25 dollars

☐ The relationship can be represented by the equation $y = 2.5x$, where x is the number of bottles and y is the cost in dollars ✓

☐ The unit rate is 2.40 dollars per bottle

☐ The relationship can be represented by the equation $y = 2.4x$, where x is the number of bottles and y is the cost in dollars

☐ The unit rate is 2.50 dollars per bottle ✓

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Test Bank question

CLAIM 1 · CONCEPTS & PROCEDURES

1B Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

Standards: 7.NS.A.1b; 7.NS.A.1c; 7.NS.1d; 7.NS.A.2b; 7.NS.A.2c; 7.NS.2a; 7.NS.A.2d; 7.NS.A.3

Assessed at: **DOK 1** **DOK 2** ~~DOK 3~~ ~~DOK 4~~

DOK 1 · Recall **Why DOK 1:** Each blank is a single routine addition of a positive or negative decimal to the total above it, so students only carry out a known procedure.

Complete the table by adding rational numbers. A basketball team's score changes are recorded below. Find the missing scores after each change.

Quarter	Score Change	Running Total
1	+12	12
2	−5.5	6.5
3	+8.25	14.75
4	−3	11.75

FIND MORE LIKE THIS

Create questions > Grade 7 > CAT > Target B > Standard > **DOK 1** > Generate

Test Bank question

DOK 2 · Skills & concepts

Why DOK 2: Students must translate a loss and a gain into signed numbers and choose the matching expression before computing, moving between words and symbols.

A football team lost 8 yards on one play and then gained 13 yards on the next play. Which expression correctly represents the total change in yards, and what is the result?

☐ $8 + 13 = 21$ yards gained

☐ $-8 - 13 = -21$ yards lost

☒ $-8 + 13 = 5$ yards gained ✓

☐ $-8 + (-13) = -21$ yards lost

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Test Bank question

CLAIM 1 · CONCEPTS & PROCEDURES

1C Use properties of operations to generate equivalent expressions

Standards: 7.EE.A.1

Assessed at: **DOK 1** **DOK 2** DOK 3 DOK 4

DOK 1 · Recall

Why DOK 1: Students apply the distributive property once to match each factored expression with its expanded form, a routine one-step procedure.

Drag each expression into the correct box to show which expressions are equivalent using the distributive property.

Equivalent to $3(x + 5)$

$3(x + 5)$ ✓

$3x + 15$ ✓

Equivalent to $2(4y + 6)$

$2(4y + 6)$ ✓

$8y + 12$ ✓

Equivalent to $5(2x + 1)$

$5(2x + 1)$ ✓

$10x + 5$ ✓

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Create questions > Grade 7 > CAT > Target C > Standard > DOK 1 > Generate

Test Bank question

DOK 2 · Skills & concepts

Why DOK 2: Students must turn a 12% increase into $1.12x$ and then decide to add the first half, combining two ideas to write one simplified expression.

A basketball team's score increased by 12% in the second half compared to the first half. If the team scored x points in the first half, write an equivalent expression that shows the total points scored in both halves combined. (Write your answer as a single simplified expression in terms of x .)

Correct answer: $2.12x$

FIND MORE LIKE THIS

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Test Bank question

CLAIM 1 · CONCEPTS & PROCEDURES

1D Solve real-life and mathematical problems using numerical and algebraic expressions and equations

Standards: 7.EE.B.3; 7.EE.B.4a; 7.EE.B.4b; 7.EE.B.4

Assessed at: **DOK 1** **DOK 2** DOK 3 DOK 4

DOK 1 · Recall **Why DOK 1:** The equation is given, so students only carry out the routine two-step solving procedure they have practiced.

A gym charges a one-time sign-up fee of 25 dollars plus 15 dollars for each month. Mia paid 100 dollars in all. The equation $15m + 25 = 100$ represents this situation, where m is the number of months. Solve the equation for m .

Correct answer: **5**

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Written for this guide

DOK 2 · Skills & concepts **Why DOK 2:** Students must solve the equation, check each claim against their work, and extend the reasoning to an inequality, which takes several steps and judgments.

A track team coach is buying new jerseys for the team. Each jersey costs 9 dollars, and there is a one-time design fee of 14 dollars. The total cost was 149 dollars. This situation can be modeled by the equation $9x + 14 = 149$, where x is the number of jerseys purchased. Decide whether each statement about this situation is true or false.

	True	False
The equation $9x + 14 = 149$ correctly represents the total cost of the jerseys.	☒	☐
Subtracting 14 from both sides gives $9x = 135$.	☒	☐
The number of jerseys purchased is $x = 15$.	☒	☐
The number of jerseys purchased is $x = 12$.	☐	☒
If the total cost had instead been less than 149 dollars, the inequality $9x + 14 < 149$ would give the solution $x < 15$.	☒	☐

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Test Bank question

1E Draw, construct, and describe geometrical figures and describe the relationships between them

Standards: 7.G.A.1; 7.G.A.2; 7.G.A.3

Assessed at: **DOK 1** **DOK 2** DOK 3 DOK 4**DOK 1 · Recall****Why DOK 1:** Students find the scale from one pair of lengths and apply it to the other, a direct computation from a scale drawing.

A basketball court is being drawn on a blueprint. The actual court is 94 feet long and 50 feet wide. On the blueprint, the court is drawn 9.4 inches long.

Part A: What is the scale factor used to create this blueprint?

Choose one answer.

☐ 10 inches : 1 foot

☐ 1 inch : 9.4 feet

☐ 1 inch : 94 feet

☒ 1 inch : 10 feet ✓

Part B: Which measurement supports your answer to Part A?

Choose one answer.

☒ The blueprint width should be 5 inches because $50 \div 10 = 5$ ✓

☐ The blueprint width should be 47 inches because $94 - 50 = 44$ plus the 9.4 inches

☐ The blueprint width should be 5.9 inches because $9.4 \div 50 = 0.188$

☐ The blueprint width should be 9.4 inches because the scale applies only to length

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Test Bank question

Why DOK 2: Students must picture each slice of the pyramid and classify the resulting cross section, deciding for themselves which shapes are possible.

A trophy for a basketball tournament is shaped like a right rectangular pyramid. Select all the descriptions below that correctly describe a possible two-dimensional cross section formed when the trophy is sliced by a plane.

A slice parallel to the rectangular base forms a rectangle. ✓

A slice that passes through the apex and is perpendicular to the base forms a triangle. ✓

A slice parallel to the base forms a circle.

A slice parallel to the base forms a pentagon.

A slice through the apex, cutting through two opposite triangular faces, forms a triangle. ✓

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Test Bank question

1F Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

Standards: 7.G.B.4; 7.G.B.5; 7.G.B.6

Assessed at: **DOK 1** **DOK 2** DOK 3 DOK 4

DOK 1 · Recall **Why DOK 1:** Students recall that vertical angles are equal and adjacent angles on a line are supplementary, then do one subtraction.

On a soccer field, two straight boundary lines, line JL and line KM , intersect at point P . This forms four angles around point P : $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$, arranged in order around the point so that $\angle 1$ and $\angle 3$ are vertical angles, and $\angle 2$ and $\angle 4$ are vertical angles. The measure of $\angle 1$ is 124° . Decide whether each statement is True or False.

	True	False
$\angle 1$ and $\angle 2$ are supplementary angles.	☒	☐
$\angle 3$ measures 124° .	☒	☐
$\angle 2$ measures 124° .	☐	☒
$\angle 4$ and $\angle 1$ are vertical angles.	☐	☒
$\angle 2$ and $\angle 4$ each measure 56° .	☒	☐

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Test Bank question

DOK 2 · Skills & concepts

Why DOK 2: Students must decide which five faces get parchment, find each area, and combine them, so they plan a multi-step surface area calculation.

A rectangular baking pan measures 14 inches by 10 inches by 2 inches. Parchment covers its inside bottom and four sides. What area of parchment is needed?

☐ 308 square inches

☒ 236 square inches ✓

☐ 140 square inches

☐ 188 square inches

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Test Bank question

1G Use random sampling to draw inferences about a population

Standards: 7.SP.A.1; 7.SP.A.2

Assessed at: **DOK 1** **DOK 2** DOK 3 DOK 4**DOK 1 • Recall****Why DOK 1:** Students recognize which sampling methods are random and which are biased, recalling what makes a sample representative.

A middle school wants to estimate how many students in the entire school enjoy playing basketball. They plan to survey some students to answer this question. For each statement about their sampling method, decide whether it would help them draw a valid inference about the population.

	Valid for Drawing Inferences	Not Valid for Drawing Inferences
They randomly select 80 students from all students in the school to survey about basketball.	☒	☐
They only survey students who are on the basketball team or attend basketball games.	☐	☒
They survey 60 randomly selected students from each grade level (6th, 7th, and 8th) to get a total sample of 180 students.	☒	☐
They ask the first 50 students they see in the hallway during lunch period.	☐	☒

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Test Bank question

DOK 2 · Skills & concepts

Why DOK 2: Students turn a sample result into a rate and apply it to several population sizes, using the sample to draw inferences.

A coach randomly surveyed students at a middle school about their favorite sport. She surveyed 50 students and found that 14 preferred basketball. Based on this sample, she estimates how many students in the entire school prefer basketball. Complete the table to show the estimated number of basketball fans for different school sizes.

Total Students in School	Estimated Number Who Prefer Basketball
250	70
400	112
500	140
750	210

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Test Bank question

1H Draw informal comparative inferences about two populations

Standards: 7.SP.B

Assessed at:

DOK 1

DOK 2

DOK 3

DOK 4

DOK 2 · Skills & concepts**Why DOK 2:** Students compare the difference in means to the MAD and judge each statement, interpreting center and spread together rather than reading a value.

A volleyball coach compared the heights of players from two different teams. Team A had a mean height of 68 inches with a mean absolute deviation (MAD) of 2 inches. Team B had a mean height of 72 inches with a mean absolute deviation of 2 inches. Which statements are correct? Select all that apply.

☐ The mean heights are so close together that there is definitely no practical difference between the two teams.

☐ Team A has greater variability in heights than Team B because its mean is lower.

☒ The difference between the mean heights of the two teams is 4 inches. ✓

☒ Both teams have the same variability in player heights, so their distributions have similar spreads. ✓

☐ Team B players are typically 2 times taller than Team A players.

☒ The difference between the means is equal to 2 times the MAD, which suggests the teams have meaningfully different typical heights. ✓

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Test Bank question

1I Investigate chance processes and develop, use, and evaluate probability models

Standards: 7.SP.C.5; 7.SP.C.7a; 7.SP.C.7b; 7.SP.C.7; 7.SP.C.8; 7.SP.C.6

Assessed at: **DOK 1** **DOK 2** ~~DOK 3~~ ~~DOK 4~~

DOK 1 • Recall

Why DOK 1: Students apply the basic definition of probability, favorable outcomes over total outcomes, in one step.

A coach is selecting one player at random from a roster of 24 players to be the team captain. Of these players, 7 play forward positions. What is the probability that a forward will be selected as captain? Express your answer as a fraction in simplest form. Explain your reasoning.

Model response: The probability is $\frac{7}{24}$. Since there are 7 favorable outcomes (forwards) out of 24 total possible outcomes (all players), the probability is the ratio of favorable outcomes to total outcomes: $P(\text{forward}) = \frac{7}{24}$. This fraction is already in simplest form because 7 and 24 share no common factors other than 1.

Rubric: 1 point: Student correctly identifies the probability as $\frac{7}{24}$ and clearly explains that probability equals favorable outcomes divided by total outcomes, with verification that the fraction is in simplest form.

0 points: Anything less, including a response that is only partly correct.

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Test Bank question

A basketball coach is developing a probability model for free throw success based on past performance. Over 150 attempts, a player made 120 free throws. The coach uses this data to create a probability model where the probability of making a free throw is $\frac{120}{150}$. Based on this model, if the player attempts 50 free throws in an upcoming game, approximately how many free throws should the coach expect the player to make?

☐ 36 free throws☒ 40 free throws ✓☐ 30 free throws☐ 45 free throws

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Test Bank question

CLAIM 2

Claim 2 · Problem Solving

Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies. In the Test Bank, Claims 2, 3 and 4 are built in the performance task (PT) step: choose PT, then Area 2 · Claims 2 + 4. Each question card is marked with its claim and target (for example "Claim 2 · Tgt A"), so generate a set at the DOK you want and keep the cards for the target you need.

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2A Apply mathematics to solve well-posed problems

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4**DOK 2 • Skills & concepts**

Why DOK 2: Students compute and compare two unit prices, then use the constant rate to judge a projection and other claims, a multi-step well-posed problem.

A soccer team is analyzing their concession stand sales. During the first game, they sold 24 bottles of water for 12 dollars total. During the second game, they sold 40 bottles of water for 20 dollars total. The team wants to understand their pricing consistency and project future sales. Which statements correctly interpret the results in the context of this situation? Select all that apply.

- ☐ The team sold 16 more bottles in the second game but earned twice as much money overall.
- ☐ The unit price per bottle is 0.50 dollars in both games, so the team is charging a consistent price. ✓
- ☐ The relationship between bottles sold and money earned is not proportional because the numbers are different in each game.
- ☐ If the pattern continues, selling 60 bottles of water should bring in 30 dollars. ✓
- ☐ The second game had a lower unit price per bottle, so the team should have charged more to increase profit.
- ☐ The constant of proportionality is 0.5, meaning each bottle costs half a dollar. ✓

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: No method is given, so students must plan the steps themselves, deciding how many vans, using round-trip miles, and comparing totals and per-runner costs.

The 24 runners on a track team are traveling to a meet that is 150 miles away. The coach has two choices.

Option 1: Rent vans. Each van holds 8 runners and costs 45 dollars for the day plus 0.30 dollars for every mile driven. The vans must drive to the meet and back.

Option 2: Hire a charter bus that holds all 24 runners for 360 dollars total.

Which option costs less, and how much less per runner? Show your work and explain each decision you made.

Model response: Vans: $24 \div 8 = 3$ vans are needed. Each van drives $150 \times 2 = 300$ miles, so one van costs $45 + 0.30(300) = 45 + 90 = 135$ dollars. Three vans cost $3 \times 135 = 405$ dollars. The bus costs 360 dollars. The bus is cheaper by $405 - 360 = 45$ dollars in total. Per runner: vans cost $405 \div 24 = 16.875 \approx 16.88$ dollars and the bus costs $360 \div 24 = 15$ dollars, so the bus saves about 1.88 dollars per runner.

Rubric: 1 point: Finds that 3 vans are needed, uses the round-trip distance of 300 miles, finds the van total of 405 dollars, concludes the bus is cheaper, and finds the per-runner difference (about 1.88 dollars) with clear work.

0 points: Anything less, including a response that is only partly correct.

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2B Select and use appropriate tools strategicallyAssessed at: **DOK 1** **DOK 2** **DOK 3** ~~DOK 4~~**DOK 1 • Recall****Why DOK 1:** Students identify the obvious tool for adding exact decimal distances and the reason it fits, a direct recognition task.

A soccer coach is organizing a tournament and needs to find the total distance traveled by the team's van. The van travels to three different fields: Field A is 12.5 miles away, Field B is 8.75 miles away, and Field C is 15.25 miles away. The coach needs to add these distances together to plan fuel costs.

Part A: Which tool would be most appropriate for the coach to use to calculate the total distance accurately?

Choose one answer.

- ☒ A calculator or spreadsheet program ✓
- ☐ A map with only integer mile markers
- ☐ A ruler or measuring tape
- ☐ Estimation by rounding to the nearest whole number

Part B: Why is the tool you selected in Part A the best choice for this problem?

Choose one answer.

- ☐ It is the quickest way to round distances to the nearest mile
- ☒ It can precisely add decimal numbers like $12.5 + 8.75 + 15.25$ to get an exact total of 36.5 miles ✓
- ☐ It works only with whole numbers and avoids decimals
- ☐ It requires the coach to estimate rather than calculate exact values

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Test Bank question

A middle school basketball team is analyzing player performance data. Determine whether each strategy for selecting the appropriate tool would help solve the problem described. Select Yes or No for each statement.

	Yes	No
To find which player has the highest shooting percentage, use a graphing calculator to compute $\frac{\text{shots made}}{\text{total shots}}$ for each player.	☒	☐
To determine if a player's free throw improvement is significant over 5 games, arrange the scores in order from smallest to largest without calculating any statistics.	☐	☒
To compare the average points per game for two players across 8 games, use a spreadsheet to calculate the mean for each player's point totals.	☒	☐
To find the team's median rebound count for 12 games, use a protractor to measure angles on a bar graph.	☐	☒
To model the relationship between practice hours and game performance, create a scatter plot using graphing technology.	☒	☐

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students choose their own tool, use it to compare the plans across a range of hours, and justify why that tool fits, with more than one valid approach.

A basketball team can rent a gym using one of two plans.

Plan A: 40 dollars per week plus 15 dollars per hour.

Plan B: 25 dollars per hour with no weekly fee.

The team will rent the gym for 2 to 6 whole hours each week. Choose a tool (a table, a graph, or an equation) to find for which numbers of hours each plan costs less. Use your tool to answer the question, then explain why the tool you chose was a good choice for this problem.

Model response: Sample table: 2 hours: A = 70, B = 50; 3 hours: A = 85, B = 75; 4 hours: A = 100, B = 100; 5 hours: A = 115, B = 125; 6 hours: A = 130, B = 150. Plan B costs less for 2 or 3 hours, the plans cost the same at 4 hours, and Plan A costs less for 5 or 6 hours. (Equation method: $40 + 15h = 25h$ gives $h = 4$.) A table is a good choice because only five whole-number hour values are possible, so every case can be listed and compared directly; an equation is also a good choice because it finds the break-even point quickly.

Rubric: 1 point: Uses a tool correctly to find that Plan B is cheaper for 2 to 3 hours, the plans are equal at 4 hours, Plan A is cheaper for 5 to 6 hours, and gives a reasonable justification for the tool chosen.
0 points: Anything less, including a response that is only partly correct.

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2C Interpret results in the context of a situation

 Assessed at: **DOK 1** **DOK 2** **DOK 3** ~~DOK 4~~
DOK 1 • Recall

Why DOK 1: Students do one division and decide which plain statements correctly describe what the total and the average mean.

A soccer team scored 24 goals in 8 games this season. Based on this information, determine whether each statement correctly interprets this result.

	Correct Interpretation	Incorrect Interpretation
The team averaged 3 goals per game.	☒	☐
The team scored exactly 24 goals in each game.	☐	☒
If the team continues at this rate, they will score 36 goals in 12 games.	☒	☐
The team's scoring rate is 4 goals per game.	☐	☒
The team scored a total of 24 goals across all 8 games played.	☒	☐

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Test Bank question

DOK 2 · Skills & concepts

Why DOK 2: Students must interpret a decimal quotient in context and decide that it has to be rounded up, not just compute it.

130 students and teachers are going on a field trip. Each bus can carry 48 people. Jordan divides and gets $130 \div 48 \approx 2.71$. How many buses are needed, and why?

- ☐ 2 buses, because 2.71 rounds down to 2
- ☐ 2.71 buses, because that is the exact answer to the division
- ☒ 3 buses, because 2 buses carry only 96 people and everyone must have a seat ✓
- ☐ 4 buses, because there should always be an extra bus

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DOK 3 · Strategic thinking

Why DOK 3: Students must critique a conclusion drawn from a solution, explain it with evidence from the context, and then reason backward under a new condition.

The 7th grade is raising money for a field trip that costs 1,250 dollars. They already have 380 dollars, and they earn 45 dollars at each car wash. Lena writes $380 + 45w = 1250$ and finds $w \approx 19.33$. She says, "We need 19 car washes."

a) Is Lena correct? Explain using the context.

b) Only 18 car washes can be scheduled before the trip. Will they have enough money? If not, how much would they need to earn at each car wash instead, to the nearest cent?

Model response: a) No. After 19 car washes they would have $380 + 45(19) = 1235$ dollars, which is 15 dollars short. Since 19.33 is more than 19, they need 20 car washes ($380 + 45(20) = 1280$ dollars). b) With 18 car washes they would have $380 + 45(18) = 1190$ dollars, which is 60 dollars short. They need $1250 - 380 = 870$ dollars from 18 car washes, so $870 \div 18 \approx 48.33$ dollars per car wash; since 48.33 dollars falls slightly short, they need at least 48.34 dollars per car wash.

Rubric: 1 point: Explains that 19 washes falls short and 20 are needed, shows that 18 washes give 1,190 dollars (60 dollars short), and finds about 48.34 dollars per wash (48.33 with a note about rounding up is acceptable).

0 points: Anything less, including a response that is only partly correct.

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2D Identify important quantities and map their relationships

Assessed at: **DOK 1** **DOK 2** **DOK 3** ~~DOK 4~~**DOK 1 • Recall**

Why DOK 1: Students map one simple relationship, equal points in each of 12 games, into a one-step equation and solve it.

A volleyball team scored 156 points total across 12 games this season. If they scored the same number of points in each game, write an equation using p to represent the points scored per game, then solve for p .

Correct answer: **$p = 13$**

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Test Bank question

DOK 2 • Skills & concepts

Why DOK 2: Students must identify the rate and the fixed fee, combine them into a two-step equation, and solve it.

A volleyball team is ordering new uniforms. The cost is 12 dollars per uniform plus a one-time design fee of 45 dollars. If the total cost for the order is 189 dollars, write and solve an equation to find the number of uniforms u ordered by the team. Write your answer as a whole number.

Correct answer: **12**

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students must sort useful from extra information, link several quantities, and make rounding decisions in context to reach a conclusion.

A 7th grade class is planning a pizza party for 28 students and 2 teachers. The party will last 2 hours. Each person is expected to eat 3 slices of pizza. Each pizza has 8 slices and costs 11.50 dollars. Drinks come in packs of 12 cans for 4.75 dollars, and each person gets 1 can. The class has 175 dollars to spend.

Is 175 dollars enough? Identify the quantities you need, show how they are related, and explain your decisions.

Model response: There are $28 + 2 = 30$ people. Slices needed: $30 \times 3 = 90$. Pizzas: $90 \div 8 = 11.25$, so 12 pizzas must be ordered, costing $12 \times 11.50 = 138$ dollars. Drinks: 30 cans are needed, and $30 \div 12 = 2.5$, so 3 packs are needed, costing $3 \times 4.75 = 14.25$ dollars. Total: $138 + 14.25 = 152.25$ dollars. Yes, 175 dollars is enough, with $175 - 152.25 = 22.75$ dollars left over. The 2-hour length of the party is not needed.

Rubric: 1 point: Counts 30 people, rounds up to 12 pizzas and 3 packs of drinks, finds the total of 152.25 dollars, and concludes that 175 dollars is enough (with 22.75 dollars left).

0 points: Anything less, including a response that is only partly correct.

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CLAIM 3

Claim 3 · Communicating Reasoning

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others. In the Test Bank, Claims 2, 3 and 4 are built in the

performance task (PT) step: choose PT, then Area 3 · Claim 3. Each question card is marked with its claim and target (for example "Claim 3 · Tgt A"), so generate a set at the DOK you want and keep the cards for the target you need.

Create questions



Grade 7



PT



Area 3 · Claim 3



Standard group



Options: DOK



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3A Test propositions or conjectures with specific examples

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4**DOK 2 • Skills & concepts****Why DOK 2:** Students test a conjecture by checking each table value against the claimed rate and spot the one pair that breaks it.

A sports analyst records the distance a cyclist has traveled at different times during a race, shown in the table below.

Time (minutes): 4, 10, 15, 20

Distance (meters): 800, 2000, 2900, 4000

The analyst makes this conjecture: "This table represents a proportional relationship between time and distance, with a constant rate of 200 meters per minute."

Test the conjecture using specific values from the table. Select all statements that are true.

- ☐ Dividing 2000 by 10 gives 200, which is consistent with the conjecture. ✓
- ☐ Since all four ratios equal 200, the conjecture is fully supported by the table.
- ☐ Dividing 800 by 4 gives 200, which is consistent with the conjecture. ✓
- ☐ Dividing 2900 by 15 gives exactly 200, which is consistent with the conjecture.
- ☐ Since the ratio $\frac{2900}{15}$ does not equal 200, the table does not represent a proportional relationship, so the conjecture is false. ✓

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students choose their own examples, use them to disprove a conjecture, and explain the general pattern, which requires reasoning beyond calculation.

Marcus makes this conjecture: "If a store raises a price by 20% and later lowers the new price by 20%, the price ends up back where it started."

Test Marcus's conjecture using at least two different starting prices. Is the conjecture true? Use your examples to explain why or why not, and describe what always happens to the final price.

Model response: Example 1: 100 dollars raised 20% is $100 \times 1.2 = 120$ dollars; lowered 20% is $120 \times 0.8 = 96$ dollars, not 100. Example 2: 50 dollars becomes $50 \times 1.2 = 60$, then $60 \times 0.8 = 48$ dollars, not 50. The conjecture is false. The 20% decrease is taken from a larger amount than the 20% increase was, so more is taken away than was added. In every case the final price is $1.2 \times 0.8 = 0.96$, or 96%, of the original, which is 4% less.

Rubric: 1 point: Tests at least two prices correctly, concludes the conjecture is false, and explains that the decrease is taken from a larger amount (or that the final price is always 96% of the start).

0 points: Anything less, including a response that is only partly correct.

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3B Construct chains of reasoning that will justify or refute propositions

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4 DOK 4 is assessed only in the performance task.

DOK 2 • Skills & concepts

Why DOK 2: Students compute the average or compare totals and then judge which short arguments correctly support or refute the claim, linking a calculation to a conclusion.

A soccer team's scoring record shows they scored 45 goals in 12 games. A student makes the claim: 'The team averages more than 3.5 goals per game.' Which statements correctly support or refute this claim? Select all that apply.

- ☐ Dividing 45 by 12 gives approximately 3.75, which rounds down to 3, proving the team averages fewer goals per game.
- ☐ The team's average is $45 \div 12 = 3.75$ goals per game, which is greater than 3.5, so the claim is correct. ✓
- ☐ If the team averaged exactly 3.5 goals per game over 12 games, they would have scored $3.5 \times 12 = 42$ goals, but they scored 45, so the claim is correct. ✓
- ☐ Since 45 is only slightly more than 42, the team averages less than 3.5 goals per game.
- ☐ The team scored 45 goals in 12 games, and $45 > 3.5 \times 12$, which means they scored more than 3.5 goals per game on average. ✓
- ☐ The team would need to score at least 42 goals to average 3.5 goals per game, but they only scored 45, so the claim is false.

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Test Bank question

A store offers two deals on sports socks:

Deal 1: Buy 3 pairs, get a 4th pair free (the free pair is the lowest-priced pair).

Deal 2: 25% off every pair.

Ken says, "These deals always save the same amount of money, because getting 1 of 4 pairs free is the same as 25% off."

Construct a chain of reasoning that justifies or refutes Ken's claim. Use at least one example in which all four pairs cost the same and one example in which the prices are different.

Model response: Same prices: four pairs at 8 dollars each cost 32 dollars. Deal 1: pay for 3 pairs, $3 \times 8 = 24$ dollars. Deal 2: $32 \times 0.75 = 24$ dollars. The deals match. Different prices: pairs cost 10, 10, 10 and 2 dollars, a total of 32 dollars. Deal 1: the 2-dollar pair is free, so pay 30 dollars (save 2). Deal 2: $32 \times 0.75 = 24$ dollars (save 8). The deals are not the same. Ken's claim is only true when all four pairs cost the same. Because Deal 1 gives away the cheapest pair, its savings are less than or equal to one fourth of the total, so Deal 2 always saves at least as much as Deal 1 (and Deal 1 needs a purchase of 4 pairs).

Rubric: 1 point: Shows a correct equal-price example where the deals match and a correct different-price example where they do not, and concludes with reasoning that Ken's claim is only true when the prices are equal (Deal 2 saves at least as much otherwise).

0 points: Anything less, including a response that is only partly correct.

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DOK 4 · Extended thinking

Why DOK 4: Students investigate the claim across several changing conditions, then synthesize their results into a general argument and a justified recommendation, an extended task.

The 7th grade student council is planning a movie night to raise money. A council member claims: "If we sell twice as many tickets at half the price, we will make the same amount of money, so the ticket price does not matter."

Investigate the claim under each condition below. Show your work for each part.

Part A: There are no costs. Compare selling 200 tickets at 6 dollars each with selling 400 tickets at 3 dollars each.

Part B: Each ticket includes a snack that costs the council 1.50 dollars. Compare the profit for the same two plans.

Part C: The gym holds 350 people. Explain how this changes which plans are possible.

Part D: Write a chain of reasoning that explains when the claim is true and when it is false. Then recommend a ticket price and justify your recommendation using your results.

Model response: Part A: $200 \times 6 = 1200$ dollars and $400 \times 3 = 1200$ dollars, so revenue is the same. Part B: Profit is $200(6 - 1.50) = 900$ dollars versus $400(3 - 1.50) = 600$ dollars, so the higher price earns 300 dollars more. Part C: 400 tickets is not possible because only 350 people fit, so the 3-dollar plan can earn at most $350(3 - 1.50) = 525$ dollars. Part D: Doubling the number of tickets and halving the price keeps the money collected the same, but every extra ticket adds another snack cost (and must fit in the gym). So the claim is true only when there is no cost per ticket and enough space; when each ticket has a cost, the profit drops by the cost of the extra tickets ($200 \times 1.50 = 300$ dollars here). Recommendation: the 6-dollar price, since it earns more profit (900 dollars) and stays well under the 350-person limit. Other recommendations are acceptable if supported by the computed results.

Rubric: 1 point: Parts A to C correct, Part D reasoning partly complete.

0 points: Anything less, including a response that is only partly correct.

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3C State logical assumptions being used

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4**DOK 2 • Skills & concepts**

Why DOK 2: Students must read the coach's conclusion and identify the hidden assumption that practice alone causes the difference, interpreting the reasoning at a basic level.

A coach is analyzing volleyball team statistics. She notices that players who practice 8 hours per week have an average of 15 successful serves out of 20 attempts. Players who practice 5 hours per week have an average of 12 successful serves out of 20 attempts. The coach concludes that practicing more hours per week causes players to have higher serve success rates. Which logical assumption is the coach making in this conclusion?

☐ All players on the team practice the same amount each week regardless of their skill level.

☒ The difference in serve success is entirely due to the difference in practice hours, with no other factors affecting the outcome. ✓

☐ Practicing fewer hours per week will eventually lead to the same success rate as practicing more hours.

☐ Players who practice more hours are naturally more talented at volleyball than those who practice fewer hours.

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students must name hidden assumptions behind a calculation, evaluate them, and explain how the conclusion changes if they fail, which goes beyond picking one.

Jada read the first 30 pages of a 360-page book in 45 minutes. She says, "It will take me 9 hours to read the whole book."

- a) Show how Jada got 9 hours.
- b) State two assumptions Jada is making.
- c) For each assumption, explain whether it is reasonable, and describe how her estimate would change if that assumption were not true.

Model response: a) $360 \div 30 = 12$ groups of 30 pages, and $12 \times 45 = 540$ minutes, which is $540 \div 60 = 9$ hours. b) Sample assumptions: (1) she will read at the same rate for the whole book; (2) the rest of the pages are about as long and as hard as the first 30; (3) the time does not include breaks. c) Sample: Assumption 1 is somewhat reasonable for a short time but she may slow down when tired, which would make it take longer than 9 hours. Assumption 2 may not hold if later chapters have more text or harder ideas, which would increase the time; if later pages have pictures, the time would decrease.

Rubric: 1 point: Shows the 9-hour calculation, states two reasonable assumptions, and explains how the estimate would change if each were false.

0 points: Anything less, including a response that is only partly correct.

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3D Use the technique of breaking an argument into cases

Assessed at:

DOK 1

DOK 2

DOK 3

DOK 4

DOK 2 • Skills & concepts

Why DOK 2: Students test an example in each case and classify where the claim holds, using cases to organize a short argument.

Sasha claims that $|a + b| = |a| + |b|$ for all nonzero integers a and b . She checks three cases:

Case 1: a and b are both positive.

Case 2: a and b are both negative.

Case 3: one of a and b is positive and the other is negative.

In which case or cases is Sasha's claim always true?

☐ Case 1 only

☒ Cases 1 and 2 only ✓

☐ Case 3 only

☐ Cases 1, 2, and 3

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DOK 3 · Strategic thinking

Why DOK 3: Students must set up every case themselves, reason about the sign in each, and use the full set of cases to justify a conclusion.

Jon claims: "A product of three nonzero rational numbers is negative only when all three numbers are negative."

Break the problem into cases based on how many of the three numbers are negative (0, 1, 2, or 3). For each case, decide whether the product is positive or negative and give an example. Then use your cases to decide whether Jon's claim is correct.

Model response: 0 negative: positive, e.g. $2 \times 3 \times 4 = 24$. 1 negative: negative, e.g. $-2 \times 3 \times 4 = -24$. 2 negative: positive, e.g. $-2 \times (-3) \times 4 = 24$. 3 negative: negative, e.g. $-2 \times (-3) \times (-4) = -24$. Jon's claim is not correct: the product is also negative when exactly one number is negative. The product is negative whenever an odd number of the factors are negative, because each pair of negative factors multiplies to a positive.

Rubric: 1 point: Correctly analyzes all four cases with examples and concludes that Jon is wrong because the product is also negative with exactly one negative factor (or states the odd-number rule).
0 points: Anything less, including a response that is only partly correct.

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3E Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is

Assessed at: DOK 1 DOK 2 DOK 3 DOK 4 DOK 4 is assessed only in the performance task.

DOK 2 • Skills & concepts

Why DOK 2: Students check each coach's conclusion against the numbers given and classify the reasoning as sound or flawed, a basic judgment about each argument.

A basketball team's coach is analyzing player statistics and making conclusions about performance. Determine whether each statement about the coach's reasoning is correct or flawed.

	Correct Reasoning	Flawed Reasoning
Player A made 12 out of 15 free throws, which is 80%. Player B made 16 out of 20 free throws, which is also 80%. The coach concludes both players have equal free throw accuracy.	☒	☐
Player C scored 24 points in the first half and 18 points in the second half. The coach concludes that Player C's performance got worse, so the player must be tired.	☐	☒
Over the season, the team's average points per game increased from 68 to 72 points per game. The coach concludes the team is scoring more points on average, but this doesn't necessarily mean every game had a higher score than every previous game.	☒	☐
Player D had 8 assists in a game where the team won by 15 points. Player E had 6 assists in a game where the team won by 8 points. The coach concludes that Player D is a better playmaker than Player E.	☐	☒

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Test Bank question

A bag holds 5 red marbles, 3 blue marbles, and 2 green marbles. Kim makes two statements.

Statement 1: "There are three colors, so the probability of drawing a red marble is $\frac{1}{3}$."

Statement 2: "Half of the marbles are red, so if I draw a marble, record its color, and put it back 10 times, I will get exactly 5 red marbles."

For each statement, decide whether Kim's reasoning is correct or flawed. If it is flawed, explain the flaw and give correct reasoning.

Model response: Statement 1 is flawed. The colors are not equally likely because there are different numbers of each color. The probability of red is $\frac{5}{10} = \frac{1}{2}$. Statement 2 is flawed. The probability of red is $\frac{1}{2}$, so 5 red marbles in 10 draws is the expected number, but actual results vary from trial to trial; Kim could get 3, 6, or another number of red marbles. She can say she expects about 5, not exactly 5.

Rubric: 1 point: Identifies both statements as flawed, explains that the colors are not equally likely ($P(\text{red}) = 1/2$), and explains that 5 is the expected number, not a guaranteed result.

0 points: Anything less, including a response that is only partly correct.

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DOK 4 · Extended thinking

Why DOK 4: Students test a claim across several conditions and data sets, find where it breaks down, and synthesize their findings into an improved rule, an extended investigation.

Ravi says, "A bigger box of cereal is always the better buy, so we should always buy the largest box." A store sells the same cereal in four sizes.

Small: 12 ounces for 3.60 dollars

Medium: 18 ounces for 4.95 dollars

Large: 28 ounces for 7.84 dollars

Family: 40 ounces for 10.80 dollars

Part A: Find the price per ounce of each box. Does the data support Ravi's reasoning? Explain any flaw.

Part B: The store gives a coupon for 1.00 dollar off any one box. Find the price per ounce of each box after the coupon. Which box is now the best buy?

Part C: Ravi's family eats about 20 ounces of cereal each week, and an open box goes stale after 2 weeks. Explain how this affects whether the Family box is a good choice.

Part D: Write an improved rule for choosing a box that fixes the flaws in Ravi's reasoning. Use your results from Parts A to C to support your rule.

Model response: Part A: Small 0.30, Medium 0.275, Large 0.28, Family 0.27 dollars per ounce. The Family box is cheapest per ounce, but the Large box costs more per ounce than the Medium box, so a bigger box is not always a better buy; Ravi's reasoning is flawed. Part B: Small $2.60 \div 12 \approx 0.217$, Medium $3.95 \div 18 \approx 0.219$, Large $6.84 \div 28 \approx 0.244$, Family $9.80 \div 40 = 0.245$ dollars per ounce. With the coupon the Small box is the best buy. Part C: The family eats about 40 ounces in 2 weeks, so the Family box would be finished just as it goes stale; any cereal left over would be wasted, which adds to the real cost. Part D: Sample rule: compare unit prices after any coupons, and choose the lowest unit price among boxes the family can finish before the cereal goes stale. Box size alone does not decide the best buy.

Rubric: 1 point: Parts A and B correct with incomplete reasoning in C or D.

0 points: Anything less, including a response that is only partly correct.

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3F Base arguments on concrete referents such as objects, drawings, diagrams, and actions

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4

DOK 2 • Skills & concepts

Why DOK 2: The two radii to test are given, so students compute two areas, compare them, and explain the pattern at a basic level.

A basketball player claims that if you double the radius of a circular shooting area, the area will also double. Test this conjecture using specific examples with radii of 3 meters and 6 meters. Does the conjecture hold true? Explain your reasoning by calculating both areas and comparing them.

Model response: When the radius is 3 meters, the area is $A = \pi r^2 = \pi(3)^2 = 9\pi$ square meters. When the radius is 6 meters, the area is $A = \pi(6)^2 = 36\pi$ square meters. Doubling the radius from 3 to 6 meters quadruples the area from 9π to 36π square meters (since $36\pi \div 9\pi = 4$), not doubles it. The conjecture is false because area depends on the square of the radius, so doubling the radius multiplies the area by $2^2 = 4$.

Rubric: 1 point: Student correctly calculates both areas, compares them accurately, and explains why the conjecture is false by referencing the quadratic relationship between radius and area.

0 points: Anything less, including a response that is only partly correct.

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Test Bank question

Tomas says, " $-3 - (-5)$ must be negative because both numbers are negative."

- a) Draw a number line and use it to show how to find $-3 - (-5)$.
- b) Use your number line to explain whether Tomas is correct.
- c) Use the number line to describe, in general, when $a - b$ is positive for any two rational numbers a and b .

Model response: a) Subtracting -5 is the same as adding 5. Start at -3 and move 5 units to the right to land on 2. (Or: $-3 - (-5)$ is the distance and direction from -5 to -3 , which is 2 units to the right.) b) Tomas is not correct: $-3 - (-5) = 2$, which is positive. Being negative numbers does not decide the sign; their positions on the number line do. c) $a - b$ is positive whenever a is to the right of b on the number line (that is, $a > b$), no matter what the signs of a and b are.

Rubric: 1 point: Accurate number line showing the result 2, explains that Tomas is wrong using the number line, and states that $a - b$ is positive when a is to the right of b .

0 points: Anything less, including a response that is only partly correct.

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3G Determine conditions under which an argument does and does not apply

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4**DOK 2 • Skills & concepts**

Why DOK 2: Students must test positive, zero, and negative cases to find where the statement holds, which requires choosing examples and comparing results.

Rosa says, "When you multiply a number by $\frac{3}{4}$, the product is always less than the number you started with." For which numbers does Rosa's statement apply?

- ☐ All numbers
- ☒ Only positive numbers ✓
- ☐ Only negative numbers
- ☐ All numbers except 0

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Jamal claims: "Dividing a number by a fraction always gives a bigger number."

Determine the conditions under which Jamal's claim is true and when it is not. Consider both the number being divided and the fraction you divide by. Give an example for each condition, and write a corrected version of Jamal's claim.

Model response: True example: $6 \div \frac{1}{2} = 12$, and $12 > 6$. Fails when the fraction is greater than 1: $6 \div \frac{3}{2} = 4$, and $4 < 6$. Fails when the fraction equals 1: $6 \div 1 = 6$. Fails when the number is negative: $-6 \div \frac{1}{2} = -12$, and $-12 < -6$. Fails when the number is 0: $0 \div \frac{1}{2} = 0$. Corrected claim: Dividing a positive number by a positive fraction less than 1 gives a bigger number.

Rubric: 1 point: Identifies both conditions (the number must be positive and the divisor must be a positive fraction less than 1), supports each with examples, and writes a correct revised claim.

0 points: Anything less, including a response that is only partly correct.

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CLAIM 4

Claim 4 · Modeling & Data Analysis

Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems. In the Test Bank, Claims 2, 3 and 4 are built in the performance task (PT) step: choose PT, then Area 2 · Claims 2 + 4. Each question card is marked with its claim and target (for example "Claim 4 · Tgt A"), so generate a set at the DOK you want and keep the cards for the target you need.

Create questions



Grade 7



PT



Area 2 · Claims 2 + 4



Standard group



Options: DOK



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4A Apply mathematics to solve problems from everyday life (Modeling)

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4**DOK 2 • Skills & concepts**

Why DOK 2: Students must work through a real-world discount and tax problem step by step and check each computation to locate the first error.

A pair of soccer cleats regularly costs 80 dollars. The store has a 25% markdown, and then 8% sales tax is applied to the discounted price. Kai solved for the final price he pays. Select the step where Kai made his first error.

Step 1: Discount = $0.25 \times 80 = 20$ dollars

Step 2: Sale price = $80 - 20 = 60$ dollars

Step 3: Tax = $0.08 \times 60 = 5.60$ dollars ✓

Step 4: Total price = $60 + 5.60 = 65.60$ dollars

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students must model a real situation by planning several dependent steps, including a unit conversion and rounding decisions, with more than one valid approach.

Mr. Ortiz wants to cover a rectangular patio that is 12 feet by 15 feet with square tiles. Each tile is 18 inches on a side. Tiles are sold only in boxes of 10, and each box costs 42 dollars. He plans to buy 10% more tiles than he needs to cover the patio, in case some break.

How much will Mr. Ortiz spend on tiles? Show your work and explain each decision you make.

Model response: Each tile is 18 inches = 1.5 feet on a side. The patio needs $12 \div 1.5 = 8$ tiles across and $15 \div 1.5 = 10$ tiles along, so $8 \times 10 = 80$ tiles. (Or: patio area $12 \times 15 = 180$ square feet; tile area $1.5 \times 1.5 = 2.25$ square feet; $180 \div 2.25 = 80$ tiles.) Ten percent extra: $80 \times 1.10 = 88$ tiles. Boxes: $88 \div 10 = 8.8$, so he must buy 9 boxes. Cost: $9 \times 42 = 378$ dollars.

Rubric: 1 point: Converts 18 inches to 1.5 feet (or the patio to inches), finds 80 tiles, adds 10% to get 88, rounds up to 9 boxes, and finds 378 dollars, with each decision explained.

0 points: Anything less, including a response that is only partly correct.

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4B Construct chains of reasoning to justify mathematical models

Assessed at: DOK 1 DOK 2 DOK 3 DOK 4 DOK 4 is assessed only in the performance task.

DOK 2 • Skills & concepts

Why DOK 2: Students must find the rate from the table, reason out the starting fee, and link the reason to the model, rather than reading one value.

A bike rental shop records these costs:

Hours	Cost (dollars)
1	10
2	14
3	18
4	22

Which model fits the data, and which reason correctly justifies it?

- ☐ $C = 10h$, because 1 hour costs 10 dollars
- ☐ $C = 4h$, because the cost goes up 4 dollars each hour
- ☒ $C = 4h + 6$, because the cost goes up 4 dollars each hour and $4(1) + 6 = 10$ matches the cost for 1 hour ✓
- ☐ $C = 6h + 4$, because there is a 6-dollar charge each hour plus a 4-dollar fee

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DOK 3 · Strategic thinking

Why DOK 3: Students must connect data to each part of the model in a logical sequence, explaining why it fits, not only checking that it does.

A pool is being drained at a constant rate. After 2 hours, 9,600 gallons of water remain. After 5 hours, 6,000 gallons remain. Ella says the model $G = 12000 - 1200t$ gives the number of gallons G left after t hours.

- a) Construct a chain of reasoning, using the data, to justify or refute Ella's model. Explain what 12,000 and 1,200 mean in the situation.
- b) Use the model to find how long it takes to drain the pool completely.

Model response: a) From 2 to 5 hours, the water drops $9600 - 6000 = 3600$ gallons in 3 hours, so the rate is $3600 \div 3 = 1200$ gallons per hour. Going back 2 hours from 9,600 gallons gives $9600 + 2(1200) = 12000$ gallons at the start. Check: $12000 - 1200(2) = 9600$ and $12000 - 1200(5) = 6000$. Ella's model is justified: 12,000 is the starting amount of water in gallons, and 1,200 is the number of gallons drained each hour. b) $12000 - 1200t = 0$ gives $1200t = 12000$, so $t = 10$ hours.

Rubric: 1 point: Finds the rate of 1,200 gallons per hour and the starting amount of 12,000 gallons from the data, verifies both points, explains the meaning of each number, and finds 10 hours.

0 points: Anything less, including a response that is only partly correct.

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DOK 4 · Extended thinking

Why DOK 4: Students build and test several models with data from more than one source and synthesize the results into a justified recommendation, an extended multi-part investigation.

The 7th grade is selling class T-shirts for 15 dollars each. In a random survey of 120 of the school's 600 students, 40 said they would buy a shirt. The class can order from three suppliers.

Supplier A: 75 dollar setup fee plus 6 dollars per shirt.

Supplier B: 9 dollars per shirt, no setup fee.

Supplier C: 7.50 dollars per shirt, but the class must pay for at least 150 shirts.

Part A: Use the survey to estimate how many shirts the class will sell.

Part B: Write a cost model for each supplier, where n is the number of shirts ordered.

Part C: Find the profit with each supplier for your estimate from Part A. Then find the number of shirts at which Supplier A and Supplier B cost the same.

Part D: Recommend a supplier. Write a chain of reasoning that justifies your recommendation, including what would happen if actual sales were much lower than your estimate.

Model response: Part A: $\frac{40}{120} = \frac{1}{3}$, and $\frac{1}{3} \times 600 = 200$ shirts. Part B: A: $C = 75 + 6n$; B: $C = 9n$; C: $C = 7.50n$ for $n \geq 150$, and $C = 1125$ dollars for $n < 150$. Part C: Revenue $200 \times 15 = 3000$ dollars. A costs $75 + 6(200) = 1275$, profit 1,725 dollars. B costs $9(200) = 1800$, profit 1,200 dollars. C costs $7.50(200) = 1500$, profit 1,500 dollars. A and B cost the same when $75 + 6n = 9n$, so $n = 25$ shirts. Part D: Supplier A gives the greatest profit at the estimated 200 shirts and costs less than B for any order over 25 shirts. It also costs less than C for every order (A costs 975 dollars at 150 shirts, and C's minimum is 1,125 dollars). If sales were much lower, Supplier C would be the riskiest because the class pays for 150 shirts no matter what. Supplier A is recommended unless sales fall below 25 shirts.

Rubric: 1 point: All parts attempted with one error, or Part D reasoning incomplete.

0 points: Anything less, including a response that is only partly correct.

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4C State logical assumptions being used

Assessed at: **DOK 1** **DOK 2** **DOK 3** ~~DOK 4~~**DOK 1 • Recall**

Why DOK 1: Students recognize the assumption that is directly described in the situation, a recall-level identification with no calculation.

A basketball coach is creating a model to predict the total points a player will score in a season. The coach assumes that the player will play in all 82 games and will score the same number of points in each game based on their average from the first 10 games. Which statement describes a logical assumption the coach is making?

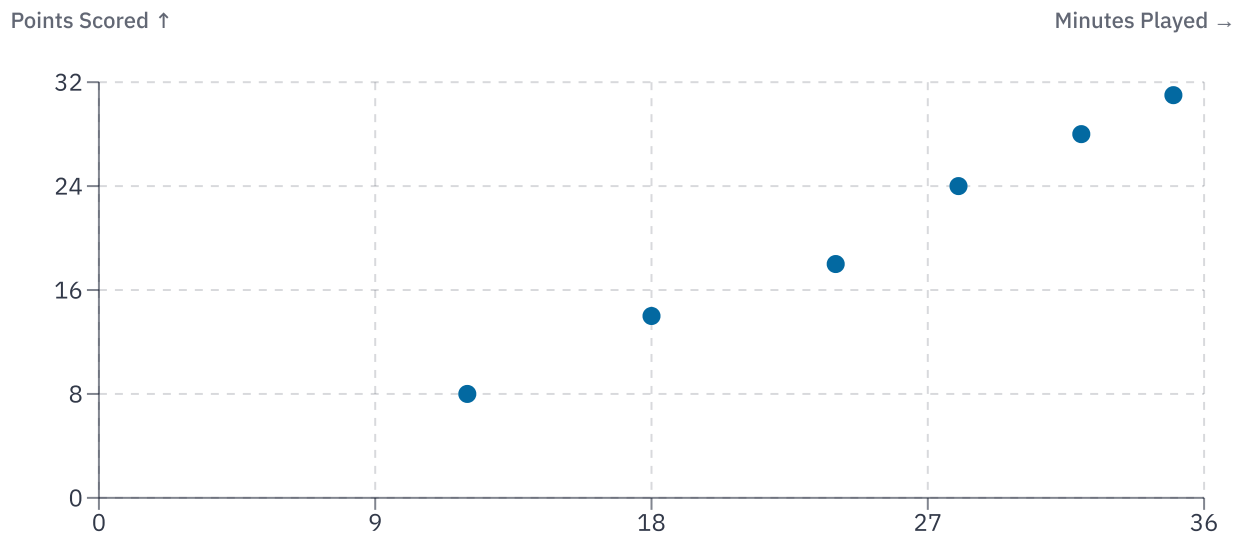
- ☒ The player will maintain a consistent scoring average throughout the entire season. ✓
- ☐ The player's scoring average is affected by the weather on game days.
- ☐ The player will be injured and miss at least 5 games during the season.
- ☐ The player's performance will improve significantly in the second half of the season.

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Test Bank question

A coach is analyzing a player's scoring pattern shown in the scatter plot. The coach notices that as minutes played increases, points scored increases in a roughly linear pattern. Which assumption would be MOST important for the coach to state when using this relationship to predict future performance?

Basketball Player Performance: Points Scored vs. Minutes Played



- ☐ The player will score exactly the same number of points in every game regardless of minutes played.
- ☐ The player will always play at least 12 minutes in every game.
- ☒ The player's scoring rate will remain consistent in future games under similar playing conditions. ✓
- ☐ Other players on the team will not affect how many points this player scores.

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students must uncover the hidden assumptions behind the prediction, judge whether each is reasonable, and support their judgment with evidence.

A middle school volleyball team is planning a fundraiser. The team sold 45 cupcakes on Friday and 38 cupcakes on Saturday. Based on this data, the team predicts they will sell 300 cupcakes total over a 7-day week. Identify at least two logical assumptions the team made in creating this model. Explain whether each assumption is reasonable and why.

Model response: Two reasonable assumptions are: (1) The team assumes that Friday and Saturday sales are representative of typical days for the week. This is somewhat questionable because weekends may have different sales patterns than weekdays, so averaging these two days may not accurately predict weekday sales. (2) The team assumes that sales will remain constant throughout the week, which may not be realistic because sales could increase as the event becomes more publicized or decrease as fewer cupcakes remain. A more reasonable assumption would be that different days of the week have different sales rates. To create a better model, the team should collect data from all seven days or make separate predictions for weekdays versus weekend days.

Rubric: 1 point: Identifies at least two assumptions clearly, explains the reasoning behind them, and justifies whether they are reasonable with specific evidence.

0 points: Anything less, including a response that is only partly correct.

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Test Bank question

4D Interpret results in the context of a situation

Assessed at: DOK 1 **DOK 2** DOK 3 DOK 4

DOK 2 • Skills & concepts

Why DOK 2: Students check each result against the context, noticing impossible values like more makes than attempts or a negative count, which means interpreting results rather than computing.

A middle school basketball team tracked their free throw performance over four practice sessions. The coach recorded the number of successful free throws out of attempts for each session. For each statement about the data, determine whether it makes sense based on the context and reasonableness of the results.

	Makes Sense	Does Not Make Sense
Session 1: 45 successful free throws out of 50 attempts. The team's free throw percentage is 90%, which suggests strong shooting accuracy that could realistically improve over the season with consistent practice.	☒	☐
Session 2: 38 successful free throws out of 35 attempts. This result shows the team made more baskets than shots attempted, indicating exceptional skill development.	☐	☒
Session 3: 22 successful free throws out of 48 attempts. With a success rate of approximately 46%, this represents a significant drop from Session 1, which could reflect player fatigue or decreased focus during practice.	☒	☐
Session 4: The team made -8 successful free throws out of 52 attempts. This negative result demonstrates they need to work on their shooting technique.	☐	☒

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Test Bank question

DOK 3 · Strategic thinking

Why DOK 3: Students must interpret an inequality's solution in context, critique two claims, and revise their conclusion when new information about the situation appears.

A freight elevator can safely carry at most 1,500 pounds. The elevator operator weighs 180 pounds and must ride with every load. Each box of books weighs about 45 pounds.

- a) Write and solve an inequality to find the number of boxes, b , that can go in one trip.
- b) Ana says the answer is 30 boxes because 29.33 rounds to 29, "and one more is fine." Ben says the answer is 29 boxes. Who is correct? Explain using the context.
- c) The boxes actually weigh between 40 and 50 pounds each. Explain how this information changes the number of boxes you would recommend for one trip, and why.

Model response: a) $180 + 45b \leq 1500$, so $45b \leq 1320$ and $b \leq 29.33$. b) Ben is correct. Thirty boxes would weigh $30 \times 45 = 1350$ pounds, and with the operator the total is 1530 pounds, which is over the limit. Since 29.33 is the maximum, only whole numbers 29 or fewer are safe: $180 + 45(29) = 1485$ pounds. c) If every box could weigh as much as 50 pounds, then $180 + 50b \leq 1500$ gives $b \leq 26.4$, so the safe recommendation is 26 boxes per trip. Using the average of 45 pounds could put a heavy load over the limit, so the safety situation calls for the worst case.

Rubric: 1 point: Correct inequality and solution, explains that Ben is correct because 30 boxes exceed 1,500 pounds, and recommends 26 boxes using the 50-pound worst case with a clear reason.

0 points: Anything less, including a response that is only partly correct.

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4E Analyze adequacy and make improvements to existing models

Assessed at: ~~DOK 1~~ **DOK 2** **DOK 3** **DOK 4** DOK 4 is assessed only in the performance task.

DOK 2 • Skills & concepts

Why DOK 2: Students must see why the original model fails, use two data points to find a better rule, and check each choice, which takes several steps.

Sam is modeling the height of a stack of plastic cups. He knows one cup is 12 centimeters tall, so his model is $H = 12n$, where n is the number of cups. When he stacks 5 cups, the stack is only 20 centimeters tall, because the cups fit inside each other. Which model is the best improvement on Sam's model?

☐ $H = 12n$, since each cup is still 12 centimeters tall

☐ $H = 4n$, since $20 \div 5 = 4$

☒ $H = 2n + 10$, since each added cup adds 2 centimeters to the first cup's 12 ✓

☐ $H = 12 + 2n$, since each cup adds 2 centimeters to the 12-centimeter cup

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DOK 3 · Strategic thinking

Why DOK 3: Students must judge a model against evidence, build an improved model from the data, explain its parts, and use it, which requires analysis and planning.

Jen sells lemonade for 1 dollar a cup. Her model for profit is $P = 1.00c$, where c is the number of cups sold. Her records show:

Day 1: 40 cups sold, profit of 18 dollars

Day 2: 60 cups sold, profit of 33 dollars

- a) Use the data to explain why Jen's model is not adequate.
- b) Write an improved model that fits both days. Explain what each number in your model means.
- c) Use your improved model to find how many cups Jen must sell to make a profit of at least 50 dollars in one day.

Model response: a) Jen's model predicts 40 dollars and 60 dollars of profit, but the actual profits were 18 and 33 dollars, so it ignores her costs. b) From Day 1 to Day 2, 20 more cups added $33 - 18 = 15$ dollars, so each cup adds $15 \div 20 = 0.75$ dollars of profit. Then $0.75(40) = 30$, and $30 - 18 = 12$, so $P = 0.75c - 12$. Check: $0.75(60) - 12 = 33$. The 0.75 means each cup earns 75 cents after its 25-cent cost, and the 12 is a fixed daily cost (such as stand rental). c) $0.75c - 12 \geq 50$ gives $0.75c \geq 62$, so $c \geq 82.67$. She must sell at least 83 cups.

Rubric: 1 point: Explains the model's failure using the data, writes $P = 0.75c - 12$ with correct meanings, and finds 83 cups.

0 points: Anything less, including a response that is only partly correct.

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DOK 4 · Extended thinking

Why DOK 4: Students analyze data from several events, judge the model's adequacy, build and test an improved model, and weigh trade-offs, an extended multi-step investigation.

The student council orders pizza for school events using this model: "Order 1 pizza for every 3 people." Each pizza has 8 slices and costs 11 dollars. Here are their records from the last three events.

Event 1: 60 people, 20 pizzas ordered, 6 pizzas left over

Event 2: 90 people, 30 pizzas ordered, 8 pizzas left over

Event 3: 45 people, 15 pizzas ordered, 4 pizzas left over

Part A: For each event, find how many pizzas were eaten and the number of slices eaten per person, rounded to the nearest hundredth.

Part B: Use your results to explain whether the council's model is adequate.

Part C: Write an improved model for the number of pizzas to order for n people. Explain how you decided on it, including how you handle a result that is not a whole number.

Part D: The next event will have 120 people. Compare the number of pizzas and the cost using the old model and your improved model, and explain whether your model should include a few extra pizzas.

Model response: Part A: Event 1: 14 pizzas eaten, $14 \times 8 = 112$ slices, $112 \div 60 \approx 1.87$ slices per person. Event 2: 22 pizzas, 176 slices, $176 \div 90 \approx 1.96$. Event 3: 11 pizzas, 88 slices, $88 \div 45 \approx 1.96$. Part B: People eat about 2 slices each, but the model plans for about $8 \div 3 \approx 2.67$ slices each, so it orders too much every time (18 extra pizzas over three events, about 198 dollars wasted). It is not adequate. Part C: At 2 slices per person, 1 pizza feeds 4 people, so order $\frac{n}{4}$ pizzas, rounded up to a whole pizza. Part D: Old model: $120 \div 3 = 40$ pizzas, 440 dollars. Improved model: $120 \div 4 = 30$ pizzas, 330 dollars, saving 110 dollars. Since one event averaged nearly 2 slices per person and attendance can vary, adding 1 or 2 extra pizzas (31 to 32 pizzas, 341 to 352 dollars) is reasonable and still saves money.

Rubric: 1 point: All parts addressed with one error or one weak explanation.

0 points: Anything less, including a response that is only partly correct.

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4F Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas)

Assessed at: **DOK 1** **DOK 2** **DOK 3** ~~DOK 4~~

DOK 1 · Recall

Why DOK 1: Students recognize the one relationship between two quantities, cost and number of tickets, and match it to a simple equation.

Movie tickets cost 8 dollars each. Which equation shows the total cost C , in dollars, for t tickets?

☐ $C = t + 8$

☒ $C = 8t$ ✓

☐ $t = 8C$

☐ $C = \frac{8}{t}$

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DOK 2 · Skills & concepts

Why DOK 2: Students must organize the given quantities in a two-way table and use the row and column relationships to find each missing count, several connected steps.

A survey asked 80 seventh graders about their activities. 45 students play a sport, 30 students play an instrument, and 12 students do both. Complete the two-way table.

	Plays an instrument	Does not play an instrument	Total
Plays a sport	12	33	45
Does not play a sport	18	17	35
Total	30	50	80

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DOK 3 · Strategic thinking

Why DOK 3: Students must sort relevant from irrelevant information and map how volume, a ratio, bag sizes, and prices connect before they can draw a conclusion.

A class is building two raised garden beds. Each bed is 8 feet long and 3 feet wide and will be filled 1.5 feet deep. The beds are 4 feet from the fence. The filling must be 2 parts soil to 1 part compost by volume. Soil comes in 1.5-cubic-foot bags for 7.50 dollars each. Compost comes in 1-cubic-foot bags for 6 dollars each. Seeds cost 3 dollars a packet. The class has 400 dollars to spend on filling the beds.

Identify the quantities you need and the ones you do not. Use a diagram, table, or formulas to show how the quantities are related. Then decide whether the class has enough money to fill both beds.

Model response: Not needed: the 4 feet from the fence and the seed price. Volume of one bed: $8 \times 3 \times 1.5 = 36$ cubic feet, so two beds need 72 cubic feet. Soil is $\frac{2}{3}$ of the mix: $\frac{2}{3} \times 72 = 48$ cubic feet; compost is $\frac{1}{3}$: 24 cubic feet. Soil bags: $48 \div 1.5 = 32$ bags, $32 \times 7.50 = 240$ dollars. Compost bags: 24 bags, $24 \times 6 = 144$ dollars. Total: $240 + 144 = 384$ dollars. Yes, 400 dollars is enough, with 16 dollars left over.

Rubric: 1 point: Identifies the extra information, finds 72 cubic feet, splits it 48 and 24 by the 2 to 1 ratio, finds 32 soil bags and 24 compost bags, totals 384 dollars, and concludes 400 dollars is enough.
0 points: Anything less, including a response that is only partly correct.

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4G Identify, analyze, and synthesize relevant external resources to pose or solve problems

Assessed at: DOK 1 DOK 2 DOK 3 DOK 4 Assessed only in the performance task, at DOK 3 and 4.

DOK 3 • Strategic thinking

Why DOK 3: Students must choose the relevant facts from two separate resources, combine them, and make purchasing decisions to solve the problem, which requires planning.

A class wants to bake 120 cookies for a bake sale and sell them at 3 cookies for 1 dollar. Use the two resources below.

Recipe card (makes 24 cookies): $2\frac{1}{4}$ cups flour, 1 cup butter (2 sticks), $\frac{3}{4}$ cup sugar, 2 eggs, baking time 10 minutes.

Store flyer: Flour, 5-pound bag (about 18 cups) for 3.49 dollars. Butter, package of 4 sticks for 4.29 dollars. Sugar, 4-pound bag (about 9 cups) for 3.19 dollars. Paper plates, 50 for 2.99 dollars.

The class already has the eggs. Decide which information you need, find the cost of the flour, butter, and sugar the class must buy, and find the profit from selling all 120 cookies.

Model response: Scale factor: $120 \div 24 = 5$. Flour: $5 \times 2\frac{1}{4} = 11\frac{1}{4}$ cups, so 1 bag (18 cups) for 3.49 dollars. Butter: $5 \times 2 = 10$ sticks, so $10 \div 4 = 2.5$, round up to 3 packages, $3 \times 4.29 = 12.87$ dollars. Sugar: $5 \times \frac{3}{4} = 3\frac{3}{4}$ cups, so 1 bag for 3.19 dollars. Total cost: $3.49 + 12.87 + 3.19 = 19.55$ dollars. Sales: $120 \div 3 = 40$ groups, so 40 dollars. Profit: $40 - 19.55 = 20.45$ dollars. Not needed: baking time, eggs, and paper plates.

Rubric: 1 point: Scales the recipe by 5, buys 1 bag of flour, 3 packages of butter, and 1 bag of sugar, finds the cost of 19.55 dollars, and finds a profit of 20.45 dollars, ignoring the extra information.
0 points: Anything less, including a response that is only partly correct.

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DOK 4 • Extended thinking

Why DOK 4: Students must gather and combine facts from several resources, carry out an extended multi-part analysis, and design and test their own solution, which is extended thinking.

The 7th grade is choosing a field trip. There are 96 students. One adult chaperone is required for every 10 students or part of 10, so 10 chaperones are needed. Use the three resources below.

Resource 1, Bus company rate sheet: Each bus seats 50 people. Each bus costs 150 dollars for the

driver plus 2.50 dollars per mile, counting the round trip.

Resource 2, Science Museum: 70 miles from school (one way). Student tickets cost 9 dollars. Groups of 20 or more students get 15% off student tickets. Chaperones get in free.

Resource 3, Aquarium: 45 miles from school (one way). Tickets cost 14 dollars for everyone, students and chaperones. No group discount.

Fundraising will cover 25 dollars per student. All costs, including chaperones, are shared by the students.

Part A: How many buses are needed? Explain.

Part B: Find the total cost and the cost per student for each trip, to the nearest cent.

Part C: Which trip fits the budget? By how much is each trip over or under the total budget?

Part D: The students vote for the Aquarium. Using the resources, propose one realistic change that would make the Aquarium trip fit the budget, and show that it works.

Model response: Part A: $96 + 10 = 106$ people; 2 buses seat only 100, so 3 buses are needed. Part B: Museum: round trip 140 miles; one bus $150 + 2.50(140) = 500$ dollars; 3 buses 1,500 dollars; tickets $96 \times 9 \times 0.85 = 734.40$ dollars; total 2,234.40 dollars; per student $2234.40 \div 96 = 23.28$ dollars (rounded from 23.275). Aquarium: round trip 90 miles; one bus $150 + 2.50(90) = 375$ dollars; 3 buses 1,125 dollars; tickets $106 \times 14 = 1484$ dollars; total 2,609 dollars; per student about 27.18 dollars. Part C: The budget is $96 \times 25 = 2400$ dollars. The Museum is 165.60 dollars under budget; the Aquarium is 209 dollars over. Part D: Sample: raise an extra 2.18 dollars per student (about 209 dollars in total), or have the school or parents pay the 140 dollars of chaperone tickets and raise the remaining 69 dollars. Any proposal that uses the resources and shows the new total is at most 2,400 dollars is acceptable.

Rubric: 1 point: All parts addressed with one computational error or an incomplete Part D.

0 points: Anything less, including a response that is only partly correct.

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Sources

- Smarter Balanced Assessment Consortium, 2015–16 Summative Technical Report: claim statements, and the Appendix 2.A test blueprints (pp. 43–48), which list the DOK levels assessed for every claim and target. <https://www.cde.ca.gov/ta/tg/ca/documents/sb16sbtechrpt.pdf>
- Target wording and standards: Smarter Balanced Mathematics Content Specifications and the CCSS for Mathematics, as stored in the AchieveMetrics Test Bank.
- DOK level definitions: Smarter Balanced Content Specifications (Webb Depth of Knowledge), summarised on the "How to use" page.

- Example questions: the AchieveMetrics Test Bank, reviewed for this guide.

AchieveMetrics Test Bank · DOK Progression Guide · Grade 7 Math · October 2026 edition.

